

PHY 131 sec. EG  
Homework 3  
W. Trimble  
Due: 2017-09-13

**Exercises**

1. In 1957 the world record for the 1000m race was 2:19.0; that's 139.0 seconds. What is the average speed of a runner running this fast? What is the average velocity for a runner running this fast around a loop?
2. A typical elevator has a cruising speed of 7 m/s. How long would it take to stop if it decelerates at  $0.9 \text{ m/s}^2$  ?
3. An elevator in a "drop test" is dropped. It falls for 0.6 seconds before the brake starts braking, and the brake decelerates the elevator car at  $5 \text{ m/s}^2$ .
  - (a) How fast is the elevator going when the brake turns on?
  - (b) How long does it take for the elevator to stop?
  - (c) How far does the elevator go while falling?
  - (d) How far does the elevator go while braking?
4. A 737 can land at 255 kph or 71 m/s, and can decelerate at  $3.0 \text{ m/s}^2$ . How much time will it take stop?
5. A heavily laden 737 might need to accelerate to 89 m/s to take off. How fast is it accelerating if it can change its speed from 4 m/s to 89 m/s in 41 seconds?
6. A cyclist accelerates from 2 kph to a speed of 20 kph in 22 seconds. What is the cyclist's average acceleration (in  $\text{m/s}^2$ ) ?
7. Michigan avenue is about 10m above the Chicago river. Neglecting air resistance, how long will it take an object dropped from rest to hit the water?
8. Sometimes accelerations are compared to the acceleration due to gravity, indicated by the symbol  $g$ , where  $g = 9.8 \text{ m/s}^2$ . How many  $\text{m/s}^2$  is a  $20g$  acceleration in an automotive crash?